

WHAT IS CLAIMED IS:

1. A method of forming stabilized microbubbles for *in vivo* use, comprising the steps of:  
5        providing a first gas, a second gas, a membrane forming material, and a liquid, wherein said first gas and said second gas are present in a molar ratio of about 1:100 to about 1,000:1, and wherein said second gas is a gas at 37°C. and 760 mm Hg with the proviso that said first gas and said second gas are not water vapor; and surrounding said first gas and said second gas with said membrane forming material to form stabilized microbubbles in said liquid.
- 10      2. The method of claim 1, wherein the membrane forming material comprises at least one surfactant.
- 15      3. The method of claim 1, wherein the membrane forming material comprises a protein.
4. The method of claim 1 wherein the first gas is a gas osmotic agent.
5. The method of claim 1 wherein the second gas is a modifier gas.
- 20      6. The method of claim 4 wherein the first gas is selected from the group consisting of perfluoropropane, perfluorobutane, perfluorocyclobutane, perfluoromethylcyclobutane, perfluoropentane, perfluorocyclopentane, perfluoromethylcyclopentane, perfluorodimethylcyclobutanes, perfluorohexane, perfluorocyclohexane, perfluoroheptane, perfluorocycloheptane, perfluoromethylcyclohexane, perfluorodimethylcyclopentane, 25      perfluorotrimethylcyclobutane, and perfluorotriethylamine.
7. The method of claim 1 wherein the second gas is selected from the group consisting of nitrogen, oxygen, carbon dioxide and mixtures thereof.
- 30      8. The method of claim 1 wherein the liquid is water.
9. The method of claim 1 wherein the microbubbles are osmotically stabilized after being injected *in vivo*.

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10. The method of claim 3 wherein the protein is albumin.
11. The method of claim 1 wherein the gas is perfluorohexane and the modifier gas is nitrogen.  
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12. The method of claim 1 wherein the molar ratio of said first gas to said second gas is 1:100 to 100:1.
13. The method of claim 1 wherein the stabilized microbubble is used for diagnostic imaging.  
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14. A composition comprising stabilized microbubbles for *in vivo* use, comprising:  
a first gas, a second gas, a membrane forming material, and a liquid, wherein said first gas and said second gas are present in a molar ratio of about 1:100 to about  
15 1,000:1, and wherein said second gas is a gas at 37°C. and 760 mm Hg with the proviso that said first gas and said second gas are not water vapor; and  
said first gas and said second gas are surrounded with said membrane forming material to form stabilized microbubbles in said liquid.
- 20 15. The composition of claim 14 wherein the membrane forming material comprises at least one surfactant.
16. The method of claim 14 wherein the first gas is selected from the group consisting of perfluoropropane, perfluorobutane, perfluorocyclobutane,  
25 perfluoromethylcyclobutane, perfluoropentane, perfluorocyclopentane, perfluoromethylcyclopentane, perfluorodimethylcyclobutanes, perfluorohexane, perfluorocyclohexane, perfluoroheptane, perfluorocycloheptane, perfluoromethylcyclohexane, perfluorodimethylcyclopentane, perfluorotrimethylcyclobutane, and perfluorotriethylamine.  
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17. The composition of claim 14 wherein the second gas is selected from the group consisting of nitrogen, oxygen, carbon dioxide, air and mixtures thereof.
18. The composition of claim 14 wherein the membrane forming material is albumin.
- 35 19. The composition of claim 14 wherein the gas is perfluorohexane and the modifier gas is nitrogen.

20. The composition of claim 14 wherein the gas is perfluoropropane and the modifier gas is air.

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